outside our atmosphere, and at first blush the amount of extra blue which he deduced to be present in it would, he thought, make it so; but though he surmised the result from experiments made with rotating disks of coloured paper, he did not, I think, try the method of using pure colours, and consequently, I believe, slightly exaggerated the blueness which would result. I have taken Prof. Langley's calculations of the increase of intensity for the different rays, which I may say do not quite agree with mine, and I have prepared a mask which I can place in the spectrum giving the different proportions of each ray as calculated by him, and this when placed in front of the spectrum will show you that the real colour of sunlight outside the atmosphere, as calculated by Langley, can scarcely be called bluish. Alongside I place a patch of light which is very closely the colour of sunlight on a July day at noon in England. This comparison will enable you to gauge the blueness, and you will see that it is not very blue, and, in fact, not bluer perceptibly than that we have at the Riffel, the colour of the sunlight at which place I show in a similar way. I have also prepared some screens to show you the value of sunlight after passing through five and ten atmospheres. On an ordinary clear day you will see what a yellowness there is in the colour. It seems that after a certain amount of blue is present in white light the addition of more makes but little difference in the tint. But these last patches show that the light which passes through the atmosphere when it is feebly charged with particles does not induce the red of the sun as seen through a fog. It only requires more suspended particles in any thickness to induce it.

In observations made at the Riffel, and at 14,000 feet, I have found that it is possible to see far into the ultra-violet, and to distinguish and measure lines in the sun's spectrum which can ordinarily only be seen by the aid of a fluorescent eye-piece or by means of photography. Circumstantial evidence tends to show that the burning of the skin, which always takes place in these high altitudes in sunlight, is due to the great increase in the ultra-violet rays. It may be remarked that the same kind of burning is effected by the electric arc light, which is known to be very rich in these rays.

Again, to use a homely phrase, "You cannot eat your cake and have it." You cannot have a large quantity of blue rays present in your direct sunlight, and have a luminous blue sky. The latter must always be light scattered from the former. Now, in the high Alps you have, on a clear day, a deep blue-black sky, very different indeed from the blue sky of Italy or of England; and as it is the sky which is the chief agent in lighting up the shadows, not only in those regions do we have dark shadows on account of no intervening—what I will call—mist, but because the sky itself is so little luminous. In an artistic point of view this is important. The warmth of an English landscape in sunlight is due to the highest lights being yellowish, and to the shadows being bluish from the sky-light illuminating them. In the high Alps the high lights are colder, being bluer, and the shadows are dark, and chiefly illuminated by reflected direct sunlight. Those who have travelled abroad will know what the effect is. A painting in the Alps, at any high elevation, is rarely pleasing, although it may be true to Nature. It looks cold, and somewhat harsh and blue.

In London we are often favoured with easterly winds, and these, unpleasant in other ways, are also destructive of that portion of the sunlight which is the most chemically active on living organisms. The sunlight composition of a July day may, by the prevalence of an easterly wind, be reduced to that of a November day, as I have proved by actual measurement. In this case it is not the water particles which act as scatterers, but the carbon particles from the smoke.

Knowing, then, the cause of the change in the colour of sunlight, we can make an artificial sunset, in which we have an imitation light passing through increasing thicknesses of air largely charged with water particles. [The image of a circular diaphragm placed in front of the electric light was thrown on the screen in imitation of the sun, and a cell containing hyposulphite of soda placed in the beam. Hydrochloric acid was then added: as the fine particles of sulphur were formed, the disk of light assumed a yellow tint, and as the decomposition of the hyposulphite progressed, it assumed an orange and finally a deep red tint.] With this experiment I terminate my lecture, hoping that in some degree I have answered the question I propounded at the outset: why the sun is red when seen through a fog.

UNIVERSITY AND EDUCATIONAL INTELLIGENCE

CAMBRIDGE.—From the University accounts for 1886, just issued, we learn that the Mathematical Tripos Examiners are paid 348*l.*; Examiners in Natural Science, 575*l.*; in Medicine and Surgery, 210*l.*; all extremely moderate payments.

Science Professors received 3725*l.* from the University Chest, 1800*l.* from the Common University Fund (derived from tax on the Colleges), besides payments from special endowments; Readers, Demonstrators, and other officers connected with Science and Medicine, 2100*l.* from the University Chest; 1800*l.* from the Common University Fund. Total, 9425*l.* for teachers mainly.

The University Observatory cost 786*l.*, in addition to 164*l.* from the Sheepshanks Fund. The Botanic Garden cost 1223*l.*; the Museums and Lecture Rooms, 4221*l.*, including 100*l.* for Dr. Guillemard's collection of bird-skins from the voyage of the *Marchesa*, 11*l.* for bird-skins bought by Prof. Newton at the Jardine sale, and 8*l.* 10*s.* for a skeleton of a European elk. The Pathological Laboratory cost 167*l.* out of the foregoing amount; the Department of Human Anatomy, 356*l.*; the Woodwardian Museum, 498*l.*; the Chemical Laboratory, 517*l.*; the Cavendish Laboratory, 274*l.*, including 60*l.* for instruments. The new dissecting-room (iron) for Human Anatomy cost 350*l.*, an additional class-room for Physiology 10*l.*, charged to the Museums Reserve Fund.

At Gonville and Caius College, Dr. Shuttleworth's Scholarship of 60*l.* for three years, open to medical students of the University of not less than eight terms' standing, given for proficiency in Botany and Comparative Anatomy, has been awarded to Francis Henry Edgeworth, B.A., Scholar of the College.

SOCIETIES AND ACADEMIES

LONDON

Royal Society, March 3.—"On the Limiting Distance of Speech by Telephone." By William Henry Preece, F.R.S.

The law that determines the distance to which speaking by telephone on land-lines is possible, is just the same as that which determines the number of currents which can be transmitted through a submarine cable in a second.

It is dependent on a time-constant varying with the conditions of the circuit, invariable for the same uniform circuit, but differing for different circuits. It represents the time that elapses from the instant contact is made at the sending-end to the instant that the current begins to appear at the receiving-end. It is given by the following equation:—

$$a = \mathrm{B}krl^2,$$

B being a constant dependent principally on the units used; k the inductive capacity per unit length (mile or knot); r the resistance per unit length, and l the lengths in miles or knots.

The number of reversals which can be produced at the end of a wire per second is quite independent of the impressed E.M.F., and therefore of the strength of the current. But it depends upon the sensitiveness of the apparatus used to receive the currents. This is why such discordant results are obtained by different observers who attempt to measure the velocity of currents of electricity. It is also why the telephone is such an admirable instrument for research—for it is sensitive to the least increment or decrement of current.

The inductive capacity of overhead and underground wires was measured with great care on very dry days in different parts of the country.

The results come out as follows:—

	Capacity per mile, microfarads		Resistance per mile, B.A. ohms
No. 7½ iron wire	0·0168	...	12·0
No. 12½ copper wire	0·0124	...	5·7
Gutta-percha-covered wire in iron pipes	0·2500	...	23·0
Gutta-percha-covered wire in cables	0·2900	...	10·25

It then became necessary to determine the speed of the current through wires of different lengths, resistances, and capacities.

It was found that, for mixed wires, the speed was given by the equation

$$t = 32 \times 10^{-8}\,\mathrm{KR},$$

but for copper alone the constant was 22×10^{-8}.

The limiting distance through which it is possible to speak varies inversely with the speed of the current, and that the speed of the current varies inversely with the product of the total resistance and the total capacity of the circuit. Hence the number of reversals that it is possible to send through any circuit varies inversely with the product of the total resistance (R) and the total capacity (K), or the limiting distance—

$$S = KR \times \text{constant} \; . \; . \; . \; . \; . \; . \; . \; . \; (1)$$

This is only another form of Thomson's law for $K = lk$, and $R = lr$, and

$$\therefore \; S = krl^2 \times \text{constant}.$$

If the equation (1) be put into this form,

$$A = krx^2, \; . \; . \; . \; . \; . \; . \; . \; . \; . \; . \; (2)$$

and A be given the following values:—

Copper (overhead)	15,000
Cables and underground	12,000
Iron (overhead	10,000

the limiting distance (x) through which speech is possible is

$$x^2 = A/kr.$$

There is an interesting consequence of Thomson's law which comes out of these experiments, and that is, whether the line be a single wire completed by the earth, or a double wire making a metallic circuit, the rate of speed between the two ends is exactly the same, and therefore the distance we can speak through is just the same whether we use a single or double wire circuit. This is owing to the fact that though in the latter case we double the total resistance, we halve the total capacity, and therefore the product remains the same.

The difference between copper and iron is clearly due to self-induction, or to the electro-magnetic inertia of the latter, and the difference between copper overground and copper underground is due to the facility that the leakage of insulators offers to the rapid discharge to earth, at innumerable points, of the static charge, which in gutta-percha-covered wire can find an exit only at the ends.

It is also evident that there is no difficulty in working telephones through underground wires, even though they attain fifty miles in length, and in fact it would be better to work underground with proper copper wire from London to Brighton, than to use iron wires along the railway telegraph poles, owing to the absence of external disturbances in the former case.

March 17.—"Second Note on the Geometrical Construction of the Cell of the Honey Bee (Roy. Soc. Proc. vol. xxxix. p. 253, and vol. xli. p. 442)." By Prof. H. Hennessy, F.R.S.

The author deduces from the results established in his communications as above cited that, while the trihedral pyramid at the apex of the cell may be inscribed in a sphere whose diameter, D, is equal to the sum of the three edges of the pyramid, another sphere may be inscribed within the cell touching all of its nine faces and whose diameter, D', is equal to the diameter of the cell, and that between these diameters the following relation exists:—

$$\frac{D}{D'} = \left(\frac{3}{2}\right)^{\frac{3}{2}}.$$

The connexion between the geometrical cell and its inscribed and circumscribing spheres is pointed out as possibly bearing on the mode of formation of the actual cells.

"A Coal-dust Explosion." By W. Galloway. Communicated by R. H. Scott, M.A., F.R.S.

Zoological Society, March 1.—Prof. W. H. Flower, F.R.S., President, in the chair.—Prof. Jeffrey Bell read extracts from a communication sent to him by Mr. Edgar Thurston, Superintendent of the Government Central Museum, Madras, containing observations on two species of Batrachians of the genus *Cacopus*.—Mr. O. Salvin (on behalf of Mr. F. D. Godman) exhibited a pair of a large and rare Butterfly (*Ornithoptera victoriæ*), the male of which had been hitherto undescribed. These specimens were obtained at the end of May 1886 by Mr. C. M. Woodford, at North-West Bay, Maleita Island, one of the Solomon group.—Mr. E. B. Poulton read a paper containing an account of his experiments on the protective value of colourand markings in insects (especially in Lepidopterous larvæ) in their relation to Vertebrata. It was found that conspicuous insects were nearly always refused by birds and lizards, but that they were eaten in extreme hunger: hence the unpleasant taste failed as a protection under these circumstances. Further, conspicuous and unpalatable insects, although widely separated, tended to converge in colour and pattern, being thus more easily seen and remembered by their enemies. In the insects protected by resembling their surroundings it was observed that mere size might prevent the attacks of small enemies. Some such insects were unpalatable, but could not be distinguished from the others. In tracing the inedibility through the stages, it was found that no inedible imago was edible in the larval stage; in this stage therefore the unpleasant taste arose.—Mr. G. A. Boulenger read a paper descriptive of the fishes collected by the late Mr. Clarence Buckley in Ecuador. The set of all the species in the collection acquired by the British Museum in 1880 contained a large number of highly interesting and well-preserved specimens. Amongst them were representatives of ten species described as new to science.—Mr. Richard S. Wray, read a note on a vestigial structure in the adult Ostrich representing the distal phalanges of the third digit.—Mr. John H. Ponsonby communicated (on behalf of Mr. Andrew Garrett) the second and concluding part of a paper on the Terrestrial Mollusks of the Viti or Fiji Islands.—Mr. Edgar A. Smith gave an account of a small collection of shells from the Loo-Choo Islands, made by Mr. H. Pryer.

Geological Society, February 18.—Annual General Meeting. —Prof. J. W. Judd, F.R.S., President, in the chair.—Having presented the various medals, and the proceeds of the Donation Funds in the gift of the Society, the President read his Anniversary Address, which we have already printed.—The ballot for the Council and Officers was taken, and the following were duly elected for the ensuing year:—President: Prof. J. W. Judd, F.R.S. Vice-Presidents: H. Bauerman, Prof. T. G. Bonney, F.R.S., A. Geikie, F.R.S., Henry Woodward, F.R.S. Secretaries: W. T. Blanford, F.R.S., and W. H. Hudleston, F.R.S. Foreign Secretary: Warington W. Smyth, F.R.S. Treasurer: Prof. T. Wiltshire. Council: H. Bauerman, W. T. Blanford, F.R.S., Prof. T. G. Bonney, F.R.S., A. Champernowne, Thomas Davies, Prof. P. M. Duncan, F.R.S., A. Geikie, F.R.S., Henry Hicks, F.R.S., Rev. Edwin Hill, W. H. Hudleston, F.R.S., J. W. Hulke, F.R.S., Prof. T. McKenny Hughes, Prof. T. Rupert Jones, F.R.S., Prof. J. W. Judd, F.R.S., R. Lydekker, J. E. Marr, E. T. Newton, Prof. H. G. Seeley, F.R.S., Warington W. Smyth, F.R.S., J. J. H. Teall, Prof. T. Wiltshire, Rev. H. H. Winwood, Henry Woodward, F.R.S.

February 23.—Prof. J. W. Judd, F.R.S., President, in the chair.—The following communications were read:—On the origin of dry chalk valleys and of Coombe rock, by Mr. Clement Reid. Whilst engaged in examining the Pleistocene deposits of Sussex, for the Geological Survey, the author observed that the Coombe rock differs from anything commonly seen in the strongly glaciated districts of the Yorkshire and Lincolnshire Wolds. As in these localities, the seaward slope of the South Downs is broken by the line of a partially buried sea-cliff before passing under the low-lying drift areas. Subsequent to the formation of this sea-cliff a mass of angular flint and chalk detritus spread out from the Downs over the low lands, being seldom found far up the valleys. This is the Coombe rock, which passes further on into a worthless mixture of angular flint and loam, and at a still greater distance into almost clean brick-earth. It is not of glacial origin, neither is it marine, nor is it a gravel formed by ordinary fluviatile action. The rolling outline of the Downs, and the steep-sided dry valleys point to conditions which have passed away. However much rain may fall, the upper parts of these valleys are always dry, and no running water can be found where the incline of the bottom of the valley exceeds the slope of the plane of saturation—never more than 60 feet per mile. The author discussed the various explanations which have been offered. In suggesting an origin for the dry valleys and Coombe rock, he considers that the fauna and flora, both at Fisherton and Bovey Tracey, point to a great degree of cold, from 20° to 30° lower than what now prevails in the South of England. The ground would thus be frozen to the depth of several hundred feet, and the drainage system of the chalk entirely modified. There would be no underground circulation. The summer rains would immediately run off any steep slope, often in violent torrents. These would tear up the layer of rubble already loosened by the frost, carrying down masses of unthawed chalk too rapidly for solvents to have much effect. No Coombe rock is found in valleys that have a greater slope than 100 feet per mile. There is no need of excessive rainfall; it might have been a dry period corresponding to that of the loess. If the time had not been short, all soft rocks in the South of England would have been planed down to one gently undulating surface like the plains of Russia and Siberia. Such tundra-conditions may have occurred more than once.—Probable amount of former glaciation of Norway, as demonstrated by the present condition of rocks upon and near the western coast, by Mr. W. F. Stanley.

Mathematical Society, March 10.—Sir James Cockle, F.R.S., President, in the chair.—The following communications were made:—A metrical property of plane curves, by R. Lachlan.—Note on the Weierstrass functions, by Mr. A. G. Greenhill.—Second paper on the change of the independent variable; with applications to some functions of the reciprocant kind, by C. Leudesdorf.—A note on knots, by Mr. A. B. Kempe, F.R.S.

Chemical Society, March 3.—Dr. Hugo Müller, F.R.S., President, in the chair.—The following papers were read:—Tartaric and racemic acids and the magnetic rotatory power of their ethyl salts, by Dr. W. H. Perkin, F.R.S.—Anhydracetonebenzil, by Mr. Francis R. Japp, F.R.S., and Mr. Cosmo Innes Burton.—Condensation compounds of benzil with ketones, by the same.—Constitution of glycosine, by Mr. Francis R. Japp, F.R.S., and Mr. E. Cleminshaw.—Diphenylglyoxaline and methyldiphenylglyoxaline, by Mr. Francis R. Japp, F.R.S.—Dehydracetic acid, by Dr. W. H. Perkin, Jun.—The colouring-matter of *Drosera Whittakeri*, by Prof. E. H. Rennie.—Further notes on the di-haloid derivatives of thiocarbamide, by Dr. George McGowan.

Anthropological Institute, March 8.—Mr. Francis Galton' F.R.S., President, in the chair.—Mr. A. L. Lewis read a paper on stone circles near Aberdeen. In this paper Mr. Lewis described in detail two circles near Dyce and Portlethen respectively, and drew particular attention to the fact that they differ in two important particulars from the circles of Southern Britain. In former papers on stone circles the author had insisted on the presence of a special reference to the north-east, but in these circles the main direction is north and south. They are further distinguished from the southern circles by the existence of an oblong stone flanked by two upright stones, which is indeed their principal feature, and which exists nowhere except in the Aberdeen district, where it is almost universal. Mr. Lewis regarded the Aberdeen circles as having more affinity to the "giants' graves" found in the north of Ireland, than to the English circles to which it has always been sought to ally them.—The following papers were also read:—Palæolithic implements from the drift-gravels of the Singrauli Basin, South Mirzapore, by Mr. J. Cockburn.—Stone implements from Perak, by Mr. Abraham Hale.

Entomological Society, March 2.—Dr. D. Sharp, President, in the chair.—Mr. Slater exhibited, with the object of showing the effect of food in causing variation in Lepidoptera, two specimens of *Arctia caja*, one of which was bred from a larva fed on lime-leaves, and the other from a larva fed on low plants, the ordinary pabulum of the species.—Capt. H. J. Elwes exhibited a large number of Lepidoptera-Heterocera, caught by him at Darjeeling, in Sikkim, at an elevation of 7000 feet, on the night of August 4, 1886, between 9 p.m. and 1 a.m. The specimens exhibited represented upwards of 120 species, belonging to Bombyces, Noctuæ, Geometræ, Crambidæ, &c., many of which were believed to be undescribed. Capt. Elwes stated that Mr. A. R. Wallace's observations on the conditions most favourable for collecting moths in the tropics were fully confirmed by his own experience during four months' collecting in Sikkim and the Khasias. The conditions referred to were a dark wet night in the rainy season; a situation commanding a large extent of virgin forest and uncultivated ground; and a whitewashed veranda with powerful lamps in it. He also made some remarks on the Khasia Hills, the southern slopes of which he believed to be the true habitat of the greater part of those insects described many years ago by Prof. Westwood and others as coming from Sylhet. A discussion ensued, in which Mr. McLachan, Dr. Sharp, Mr. Champion, Mr. Kirby, and others took part.—The Rev. W. W. Fowler exhibited a specimen of *Cathormiocerus socius*, taken at Sandown, Isle of Wight.—Mr. S. Stevens exhibited specimens of *Cathormiocerus maritimus* and *Platytarsus hirtus*.—Mr. F. Grut said he was requested by M. Péringuey, of Cape Town, to announce that the latter was engaged on a monograph of the genus *Hipporrhinus*, and that he would be glad to receive specimens and other assistance from British entomologists.—Mr. Gervase F. Mathew, R.N., communicated a paper entitled "Descriptions of new species of Rhopalocera from the Solomon Islands."—Mr. G. T. Baker communicated the following papers: "Description of a new species of the Lepidopterous genus *Carama*, together with a few notes on the genus"; and "Description of a new genus of Rhopalocera allied to *Thecla*."

Institution of Civil Engineers, February 22.—Mr. Edward Woods, President, in the chair.—A paper was read on irrigation in Lower Egypt, by Mr. William Willcocks.

March 1.—Mr. Edward Woods, President, in the chair.—A paper was read on dredging-operations and appliances, by Mr. John James Webster. The author described the objects for which dredging-operations are generally carried out, and spoke of the advantage of obtaining the aid of natural scour, when possible, for supplementing or dispensing with dredging. The various kinds of appliances used were fully described.

March 15.—Mr. Edward Woods, President, in the chair.—A paper was read on the treatment of gun-steel, by Colonel Eardly Maitland, R.A.

PARIS

Academy of Sciences, March 14.—M. Janssen, President, in the chair.—Reply to M. Houzeau's additional note, by M. Lœwy. It is argued that M. Houzeau's mistake lies in the arrangement proposed by him in 1871, which is practically that of a sextant with fixed opening. The principle of the sextant is based on the combination of two mirrors, which in virtue of known optical conditions must give it an undoubted superiority over M. Houzeau's apparatus, which is provided with only one mirror.—On a problem relating to the theory of minima surfaces, by M. Gaston Darboux. To the different solutions of the problem given in vol. cii. of the *Comptes rendus* (1886), is here added another which rests on a new genesis of minima surfaces proposed in an important memoir by M. Ribaucour.—On the great movements of the atmosphere, and on M. Colladon's note of March 7, by M. H. Faye. The paper deals with M. Colladon's suggestion, based on M. Weyher's recent experiments, that rotatory movements with vertical axis may have both an ascending and a descending direction, thus presenting a middle term between the extreme views of M. Faye and his opponents.—On the artificial production of the ruby, by M. Fremy. Some remarks are presented on the two processes elaborated by MM. Fremy and Feil, in connexion with the recent death of M. Feil. A third method is referred to which has since been brought to great perfection with the co-operation of M. Verneuil. A paper followed, by MM. Fremy and Verneuil, on the action of the fluorides on alumina in connexion with the same subject.—The small *Ursus spelæus* of Gargas, by M. Albert Gaudry. A description is given of this species of cave-bear, a skeleton of which, made up with the bones of several individuals, has just been mounted in the new room for palæontological specimens in the Natural History Museum.—Details collected from various sources on the earthquake of February 23, by M. F. Fouqué. An account is given of the vibrations recorded at the Observatories of Lisbon, Wilhelmshafen, and Seville; the general conclusion being that the magnetic disturbances were not the cause, but rather the effect, of the shocks.—Report on MM. Guyou and Simart's memoir on the development of naval geometry as applied to the question of the stability of vessels, by the Commissioners, MM. Phillips, Lévy, Sarrau, and de Jonquières. The report speaks favourably of MM. Guyou and Simart's studies, which greatly reduce the elaborate calculations hitherto required to be worked out in determining questions of stability from the theoretical and practical stand-points.—Experiments on the effects of the transfusion of blood into the heads of decapitated animals (second note), by MM. G. Hayem and G. Barrier. The experiments show that the time is limited to about ten seconds, during which it is possible by transfusion of arterial blood to momentarily revive the action of the sensor and motor cortical centres.—On a correlation between earthquakes and the declinations of the moon, by M. H. de Parville. A systematic study of lunar and terrestial phenomena continued for a quarter of a century leads the author to infer a distinct relation between lunar declination and earthquakes, the general law being that the disturbances occur either at the equilune, the lunistice, or exactly when the sun and moon have the same declination.—On the variations in the absorption-spectra of didymium, by M. Henri Becquerel. Fresh experiments here described confirm the previous conclusion of the author regarding the presence of foreign substances in didymium, as revealed by its absorption-spectra. Some of these bodies may possibly be diverse combinations of the same with another substance or with itself, such combinations being so stable that it has hitherto been impossible to transform one into the other. —On the specific heat of a salt-solution, by M. P. Duhem. The method employed by the author to find the expression of the heat of solution is here shown to lead also to the expression of the specific heat of a salt-solution.—On a standard pile, by M. Gouy. The author describes a convenient standard of electromotor force, formed with zinc, sulphate of zinc, mercury, and dioxide of mercury.—Researches on the application of rotatory force to the study of certain compounds produced in the solutions of tartaric acid, by M. D. Gernez.—On a general method of forming the manganites from the permanganates, by M. G. Rousseau. The metallic permanganates are transformed to manganates at a temperature ranging from 100° to 150° C., and as the law of decomposition here formulated is applicable to the compounds of the whole series, it is proposed as a general method for obtaining most of the metallic manganates.—On the reticulated structure of the protoplasm of the Infusoria, by M. Fabre-Domergue.

BERLIN

Physiological Society, February 25.—Prof. Munk in the chair.—The President communicated two treatises sent, for publication in the Proceedings of the Society, by Prof. Kronecker, of Berne. In the first, Prof. Kronecker had, in conjunction with Fräulein Popoff, examined the formation of serous albumen in the intestinal canal. As reagents they made use of the hearts of frogs and tortoises, void of blood, which were stimulated to contraction only when blood or a solution of serous albumen was poured through them, but under every other albuminous or saline solution remained inactive. Stomachic peptone was incapable of nourishing the heart. When, however, the peptone was kept for some time in the stomach or in an intestinal coil connected with the mesentery, then it acted on the heart in the same way as did serous albumen. Pancreatic peptone was incapable, either of itself or after remaining in the stomach or the intestine, of stimulating the heart to contraction; by exposure for a considerable time to the air, the peptone likewise became nutritious to the heart.—In the second treatise, containing an investigation by Prof. Kronecker and Fräulein Rink, it was demonstrated that in peptone solution two kinds of Bacteria are developed in the presence of air: *Bacillus restituens*, which transformed the peptone into serous albumen, exactly in the same way as did the living mucous membrane of the stomach; and *Bacillus virescens*, which liquefied the alimentary gelatine and imparted a deep blue colouring to all sterilised substrata when exposed to the air. This latter Bacillus operated poisonously on the heart. —Dr. Benda spoke of the function of the cross-striped muscle substance. By anatomical investigation of the muscles of the river crayfish he had arrived at the conviction that it was only the cross striped substance which generated the contraction, while it was in the highest degree probable that the protoplasm discharged the office of mediation between the ends of the motory nerves and the contractile substance.—Prof, Ewald described some comparative experiments performed on three patients to ascertain the amount of nourishment with different commercial peptones, with eggs, and with eggs to which were added pepsine and hydrate of chlorine. The nutritive fluids were supplied *per enema*, and the individually very changeable nitrogenous transpositions were determined by careful analyses of the ingesta and egesta.

Meteorological Society, March 1.—Prof. von Bezold in the chair.—Dr. Kremser communicated the results of an investigation into the variability of atmospheric temperature in Germany. Variability he understood, in accordance with Hann's definition, to be the difference between the mean temperature on two consecutive days. Such variability was found by Dr. Kremser to attain its greatest magnitude in the mountains and in the eastern provinces, and its least range along the coasts of the Baltic and North sea, and on the islands. The maximum was in the Riesengebirge, 4°·3 F., the minimum on the islands of the North Sea, 2°·3. If the monthly means were arranged in chronological sequence for the year, there was presented an annual march of temperature with a chief maximum in December and a secondary in June. The variability of temperature at each of the different hours, 6 a.m., 2 p.m., and 10 p.m., yielded values differing from those of the variability of the daily means of temperature. Yet the yearly march of variability of each of the different hours already specified was similar to the yearly march of variability of the daily means. The greatest change of temperature affecting an individual period of twenty-four hours was observed in Clausen, amounting to 68° F. In Berlin, the greatest change to which the same period was liable was 24°·7; in Munich it was 30°·6. A variability of 18°·0 affecting a period of twenty-four hours might be expected in the course of a year in the east and south, but along the North Sea coast only in a period of three years. As the basis for the above conclusions, Dr. Kremser had made use of the observations of ten years.

BOOKS, PAMPHLETS, and SERIALS RECEIVED

Gairloch: J. H. Dixon (Edinburgh).—Catalogue of Siwalik Vertebrata contained in the Geological Department of the Indian Museum, Calcutta; part 1, Mammalia; part 2, Aves, Reptilia, and Pisces: R. Lydekker (Calcutta). —Catalogue of Pleistocene and Prehistoric Vertebrata contained in the Geological Department of the Indian Museum, Calcutta: R. Lydekker (Calcutta).—Memoirs of the Geological Survey of India. Palæontologia Indica, ser. xiii. Salt Range Fossils: W. Waagen; ser. xii. The Fossil Flora of the Gondwana System, vol. iv. part 2, The Fossil Flora of some of the Coal-Fields in Western Bengal: O. Feistmantel (Trübner).—*Challenger* Reports, vol. xviii., 3 parts.—Science of Thought: F. Max Müller (Longmans).—Le Commozioni Telluriche il Terremoto del 23 Febbraio, 1887 (Roux, Torino). —On Over-work and Premature Mental Decay, 4th edition: C. H. F. Routh (Baillière, Tindall, and Cox).—Geological History of Lake Lahontan: J. C. Russell (Washington).—Transactions of the Academy of Science of St. Louis, vol. iv. No. 4 (St. Louis).—Proceedings of the American Philosophical Society, vol. xxiii. No. 124 (Philadelphia).—Essentials of Histology, 2nd edition: E. A. Schäfer (Longmans).—Natural History Transactions of Northumberland, Durham, and Newcastle-upon-Tyne, vol. viii. part 2 (Williams and Norgate).—Verhandlungen des deutschen Wissenschaftlichen vereins zu Santiago, 3 Heft (Valparaiso).—A Plea for a Midland University: H. W. Crosskey (Cornish, Birmingham).—Proceedings of the Academy of Natural Sciences of Philadelphia, part 3, October to December 1886 (Philadelphia).—American Naturalist, January (Lippincott).—Annalen der Physik und Chemie, No. 4, 1887; Beiblätter der Physik und Chemie, No. 2, 1887 (Barth, Leipzig).

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